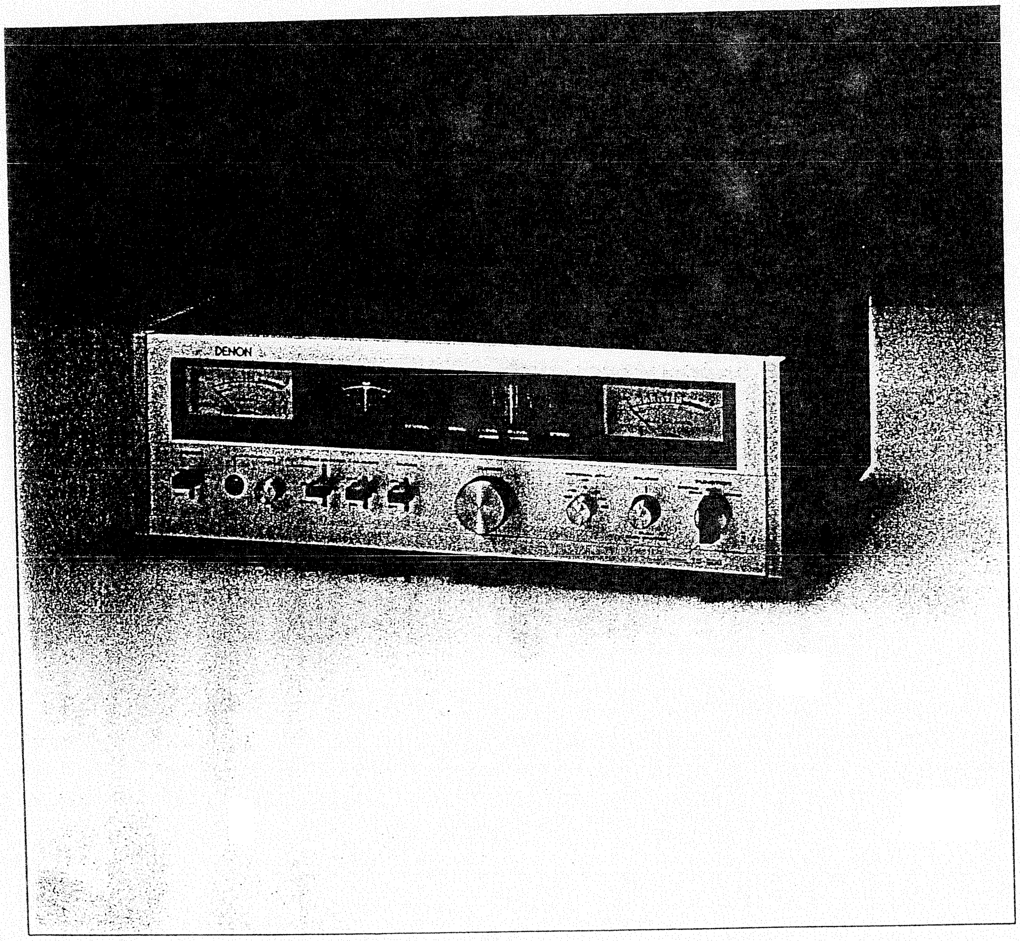
DENON Hi-Fi Component / FM Stereo Tuner

OPERATING INSTRUCTIONS

MODEL TU-500



NIPPON COLUMBIA CO., LTD.

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MAIN FEATURES

1. FRONT END

The FM 5 ganged tuning capacitor and the low noise dual gate MOS FET equipped front end gives you a much higher quality reception due to greater sensitivity and much improved interference elimination. An image rejection of 110 dB, an IF rejection of 110 dB, a spurious response of 110 dB, and a high S/N ratio of 75 dB ensure that you get the best possible reception.

Frequency drift in the local oscillator has been reduced to such a degree that the AFC circuit is no longer necessary.

2. IF STAGES

Two IF systems have been incorporated to reduce distortion to the utmost minimum. Consequently, signals of wide dynamic range have been obtained in the first stage. Two ICs operating as 3 stage differential amplifiers, an IC adapted for saturation prevention, and four 2 element phase-linear filters employed as IF filters, have also been incorporated. And coupling with the wide band ratio detector circuit gives you the ideal circuit configuration for the reception of stereo signals.

Four transistors in the control section give you wide linearity in the signal strength meter, plus the optimum range for the muting function.

3. STEREO DECORDER

Adoption of the P.L.L. (Phase Lock Loop) stereo decorder circuit means that the stereo signals being sent from the broadcasting station can be tuned in to without any change in phase at all. So even after many years of use, you will find no deterioration in separation, nor any perceptible signs of distortion in your stereo reception.

4. AUDIO FREQUENCIES SECTION

Each channel (L or R) contain five low noise transistors which further minimize distortion. And the recently developed 3 stage low pass filter further reduces carrier leak during stereo reception. The L and R channels can be operated independently, while much improvement has been accomplished in the crosstalk characteristics.

The low output impedance which is flat (constant) for frequency range between 50Hz to 15kHz, means that no response degradation can occur during the transfer of the reproduced signals to the amplifier.

5. LEVEL METERS

These consist of VU meters, which accurately indicate the tuner output levels (0dB = 0.775V) The levels of the pre amplifier output, the power amplifier output, and the tape deck amplifier output etc. can be measured through the EXTERNAL INPUT. The measuring range is from −30dB (24.5mV) to +31.8dB (30V). (The attenuator has six positions in steps of 10dB each).

The meters can also be used to measure numerous other outputs too.

(For the relationships between dB and voltage, and dB and power, refer to the Decibel Conversion Graphs on pages 18 and 19).

6. NULL BALANCE

Previously, only the pre amplifier and the stereo amplifier had balance controls. But now the DENON Hi-Fi FM Stereo Tuner TU-500 has also been equipped with a balance control. It is operated by first pressing, and then turning the BALANCE control knob. In this condition, the stereo decoder functions as monaural, so the output signals in the left and right channels cancel each other out. A level meter reading of "NULL MIN" means that the tuner outputs have been balanced exactly.

7. FUNCTIONS

When the FUNCTION switch is set to "STEREO ONLY", the tuner will only receive stereo broadcasts.

8. TUNING DIAL

The dial is a drum type "long scale", calibrated in increments of 200kHz, and is 282.6mm in length. It is very easy to operate and is extremely accurate.

A lubricant polyaceta resin bearings has been used in the tuning mechanism, greatly improving the feel of the operation.

PRECAUTIONS

A. Before you do anything else, check the TAG attached to the AC cord of your TU-500. The figure marked on this TAG is the preset rated voltage. If the voltage of the power supply in your home differs from this rated voltage, contact your nearest DENON AUTHORIZED DEALER or QUALIFIED SERVICE PERSONNEL immediately, and have them adjust the rated voltage of your set to match your home power supply. (The rated voltages available in the TU-500 are 130V, 220V and 240V).

B. The circuit components in your TU-500 have been safeguarded against normal temperature changes and voltage fluctuations, but you should never position your set in places of very high temperature (such as in direct sunlight) or high humidity. Power supply voltage fluctuations within ±10% of the rated voltage will do no harm to your set, but if the voltage varies by more than ±10%, you will require the use of a voltage regulator adjusted to the rated voltage.

APPELLATIONS AND FUNCTION OF PARTS (FRONT PANEL)

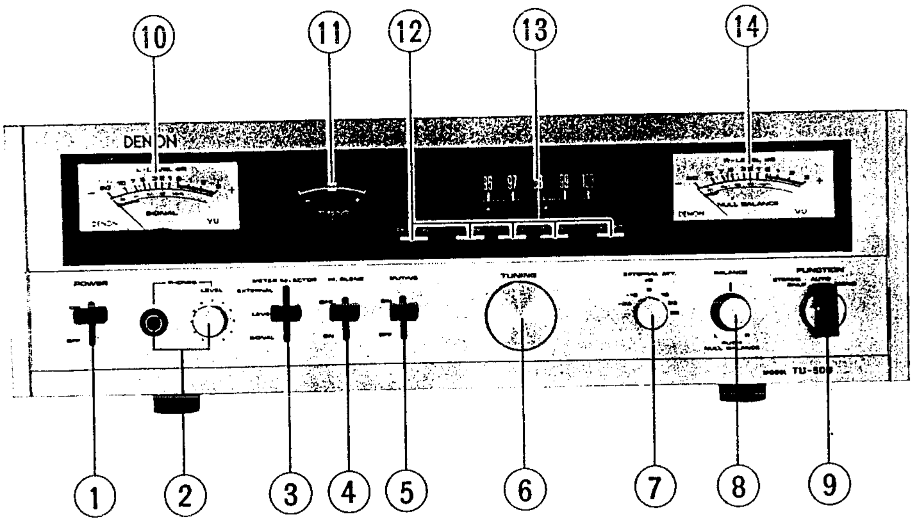


Fig. 1

① POWER ON-OFF SWITCH (Power)

This switch turns on the power source. The indicator lamps in the meters and in the tuning dial light up.

The equipment is completely warmed up and ready for use within 2 to 3 seconds. Turn the switch to OFF to turn the equipment off.

② HEADPHONE JACK WITH LEVEL CONTROL (Phones)

The stereo headphone plug is inserted into this jack, while the level is controlled by adjusting the LEVEL knob. FM broadcasts can be picked up directly in the headphones. Turning the LEVEL knob clockwise increases the headphone level, while the anticlockwise direction decreases it.

③ METER SELECTOR SWITCH (Meter Selector)

This switch decides how the left and right hand level meters are to be used.

EXTERNAL

for measuring external input signals. The input signal levels in the L and R channels will be accurately measured in the two level meters when the EXTERNAL ATT. knob is employed. (see pages 9 for details).

LEVEL

for indicating the tuner output levels in both the L and R channels. When the carrier wave has been modulated by 100% (frequency corresponding to deviation of ±75kHz), the meter wil read +2.3dB.

(This meter reading is fixed, and is independent of the LEVEL ADJUST control).

SIGNAL

used to indicate the field strength of the antenna input. This involves the left hand (L) channel meter only. The 0dB (100%) position indicates an antenna input of about 60dB/μV. The right hand meter on the other hand, still indicates the output level of the right (R) channel of the tuner, and is read of course in the same way as for LEVEL above.

(see Table 1 on page 7 for details).

④ HIGH-BLEND SWITCH (Hi. Blend)

When this switch is turned ON, any high frequency noise interfering with the reception of FM stereo broadcasts are eliminated. This kind of noise is effectively eliminated from broadcasts of even relatively weak signals.

The Hi.Blend circuit "blends" or mixes the relatively irritating high frequency noise in both left and right channels, and eliminates them without any serious loss in sensitivity to the stereo signal. The S/N ratio is thus further improved.

⑤ SWITCH FOR ELIMINATING INTER-STATION NOISE (Muting)

When this switch is turned ON, the inter-station noise (which sounds like pouring rain) disappears. Only the signals of the desired broadcasting station are received loud and clear. But if the signals of the desired broadcasting station are rather weak, the broadcast too may be eliminated along with the noise. So in this case, the MUTING control must be turned OFF.

⑥ STATION SELECTOR KNOB (Tuning)

Tune into the desired broadcasting station by turning this knob while watching the tuning dial. See the previous section (Fig. 2 Signal Strength Meter and Center Tuning Meter on page 6) on how to get the best tuniing results.

⑦ EXTERNAL INPUT ATTENUATOR (External Att.)

This attenuator is used when measuring external signals. The signal to be measured is inputted at the EXTERNAL INPUT in the rear of the equipment. The measurable voltage range is AC 24.5mV ~ 30V. Set the attenuation to match that of the input signal, and then read off the value shown in the meter. The attenuator has six positions at 10dB intervals, ie. –20dB, –10dB, 0dB, +10dB, +20dB, and +30dB.

⑧ BALANCE AND NULL BALANCE CONTROL (Balance/Push Null Balance)

The balance of the output levels in both left and right channels is controlled by this knob. When turned clockwise from the central position, the level in the left channel decreases, while turning it anticlockwise results in a decrease in the right channel level.

Then when the knob is depressed, the right hand level meter becomes the null balance meter. Keep the knob depressed when turning. The meter needle deflects leftward to a minimum position shown by the arrow on the null balance meter scale. This minimum null balance position means that the tuner input levels in both left and right channels have been balanced exactly.

⑨ FUNCTION SELECTOR SWITCH (Function)

The following three functions are selected by this knob.

MONO
All broadcasts (both stereo and mono) are received as monaural broadcasts.

AUTO
This is the normal position. Stereo broadcasts are received as stereo, and mono broadcasts are received as mono. The STEREO indicator lamp below the tuning dial lights up.

STEREO ONLY
Only stereo broadcasts are received. Mono broadcasts cannot be picked up.

⑩ METER (Meter 1)

This meter can be used in three different way, depending on the METER SELECTOR position and when used as the signal strength meter set the METER SELECTOR to the SIGNAL position. The meter needle will give maximum deflections while turning the TUNING knob.

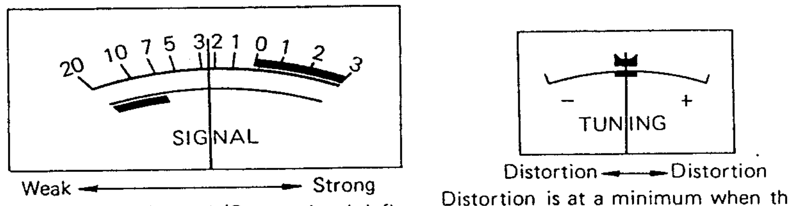
1. Right channel external input level meter.
2. Right channel tuner output level meter.
3. Signal strength meter.
   To read the signal strength, refer to signal strength conversion chart on page 7.

⑪ CENTER TUNING METER (Tuning)

When selecting a particular FM station, first tune to the position giving maximum deflection in the signal strength meter. Then tune a little more carefully to bring the indicator needle of the center tuning meter to the exact center position.

Fig. 2. Signal Strength Meter and Center Tuning Meter

(Operated only when the METER SELECTOR has been switched to SIGNAL).



Shows strength of signal (Strong signal deflects further to the right).

Distortion is at a minimum when the needle is positioned in the center. Deflections to either left or right indicate increases in distortion.

Tuning by means of the signal strength and center tuning meters gives very accurate tuning. But please remember that the function of the left hand meter (METER 1) changes according to the different METER SELECTOR positions. (See Table 1 on page 7).

⑫ LAMP INDICATORS (Indicators)

Lamps light up to show the following operations.

EXTERNAL

lights up when METER SELECTOR knob is switched to EXTERNAL, indicating that METER 1 (left hand side) and METER 2 (right hand side) are both operating as external input level meters.

SIGNAL

lights up when METER SELECTOR knob is switched to SIGNAL, indicating that METER 1 is operating as the signal strength meter.

L-LEVEL

lights up when METER SELECTOR knob is switched to either LEVEL or EXTERNAL, indicating that METER 1 is operating as the left channel level meter.

R-LEVEL

lights up together with the L-LEVEL lamp when METER SELECTOR knob is switched to either LEVEL or EXTERNAL, indicating that METER 2 is operating as the right channel level meter. Note that this lamp goes out when the BALANCE knob is depressed, since METER 2 then operates as the null balance meter.

STEREO

when the FUNCTION knob is in either the STEREO ONLY or the AUTO position, this lamp will light up automatically during the reception of FM stereo broadcasts. It does not light however, when the knob has been switched to MONO, even if a stereo broadcast is being received. The lamp will go out if the BALANCE knob is pressed, indicating that the stereo decoder is operating in the monoaural mode.

⑬ TUNING DIAL (Dial Scale)

The tuning dial is used in conjunction with the TUNING knob when selecting a particular broadcasting station.

Station tuning has been made both easy and accurate with the incorporation of a dial calibrated in increments of 200kHz to a very high degree of accuracy.

⑭ METER (Meter 2)

This meter can be used in three different ways, depending on the METER SELECTOR position and operation of the BALANCE knob (see Tables 1 and 2).

1. Right channel external input level meter.
2. Right channel tuner output level meter.
3. Null balance meter.

HOW TO READ THE METER WHEN USED AS THE SIGNAL STRENGTH METER

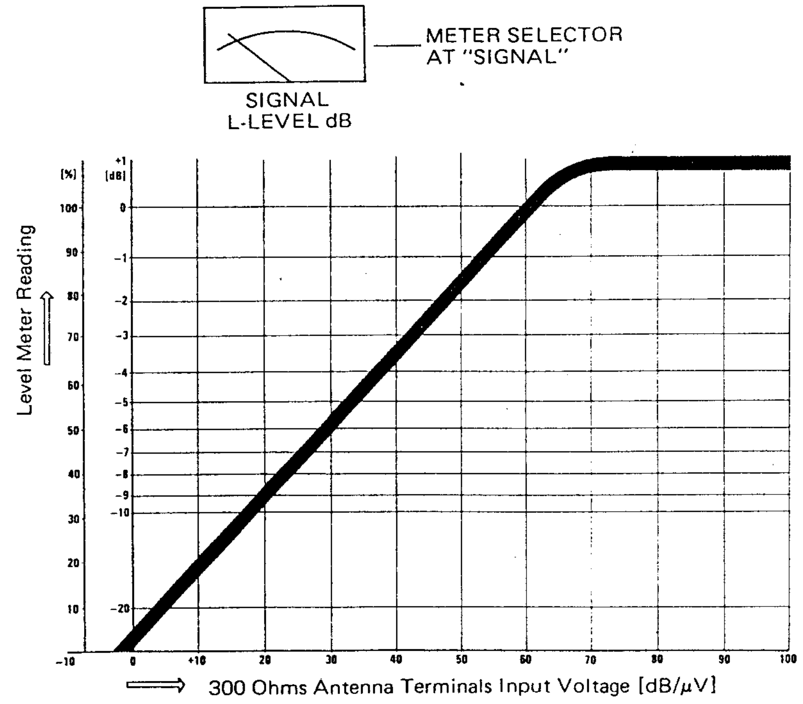


TABLE 1. METER SELECTOR Switch Positions and Corresponding Meter Functions

METER SELECTOR	METER 1 (Left)	METER 2 (Right)
EXTERNAL	External input levels in left channel.	External input levels in right channel.
LEVEL	Tuner output levels in left channel.	Tuner output levels in right channel.
SIGNAL	Antenna input field strength.	

TABLE 2. BALANCE Knob and Corresponding Meter Function

BALANCE Knob	METER 2 (Right)
Knob depressed	Null balance meter

APPELLATIONS AND FUNCTION OF PARTS (BACK PANEL)

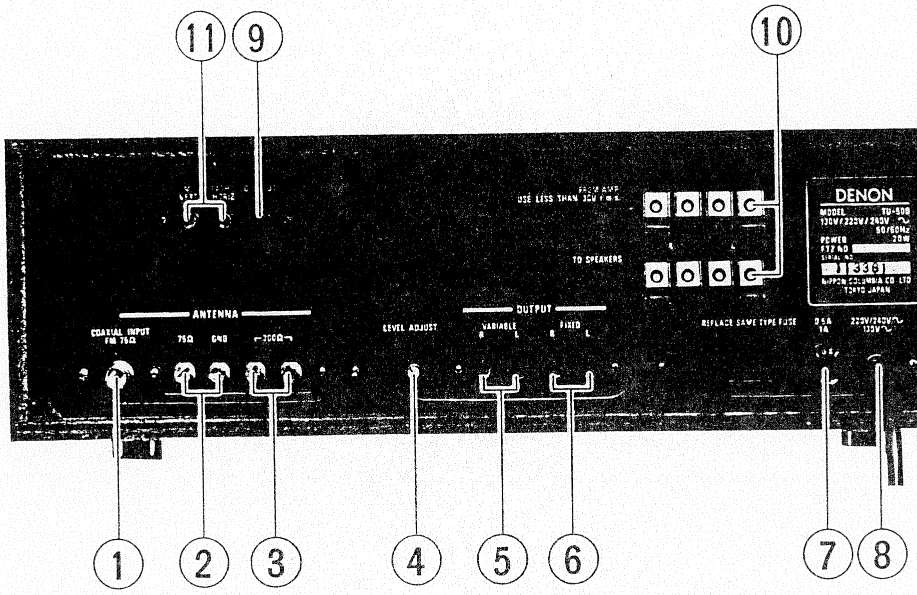

11
9
10
FROM AMP.
USE LESS THAN 30V r.m.s.
TO SPEAKERS
DENON
MODEL TU-500
130V/220V/240V ∿
50/60Hz
POWER 20W
SERIAL NO.
NIPPON COLUMBIA CO. LTD
TOKYO JAPAN
ANTENNA
COAXIAL INPUT FM 75Ω
75Ω
GND
300Ω
LEVEL ADJUST
OUTPUT
VARIABLE
R
L
FIXED
R
L
REPLACE SAME TYPE FUSE
0.5A
1A
220V/240V∿
130V∿
1
2
3
4
5
6
7
8

Fig. 3

① FM 75Ω ANTENNA COAXIAL INPUT JACK (FM 75Ω Coaxial Input)

This input is actually the same as the adjacent antenna inputs terminals ②. But in this case, the 75Ω unbalanced coaxial cable coming from the FM antenna is connected to a coaxial connector plug (for 3C-2V cable) (supplied with the equipment). Although there are various kinds of coaxial cables (3C-2V, 5C-2V, 7C-2V etc.), the most suitable kind for this antenna input is the 3C-2V. Other types should be connected to the FM 75Ω antenna input ②.

See page 11 for further details about FM antennas.

② FM 75Ω ANTENNA INPUT TERMINALS (Antenna 75Ω – GND)

Connect the 75Ω unbalanced coaxial cable for the FM antenna to these terminals. Coaxial cable has far better characteristics than feeder wire.

③ FM 300Ω ANTENNA INPUT TERMINALS (Antenna 300Ω)

The 300Ω balanced feeder wire leading from the FM antenna, is connected up to these terminals. The quality of the antenna is directly related to the noise and other interference, so it is recommended that a good multi-element antenna be employed, and that it be put as high up as possible.

④ OUTPUT LEVEL CONTROL (Level Adjust)

The output level at the VARIABLE OUTPUT can be adjusted to match the input sensitivity of the stereo amplifier connected to the tuner.

Switch the FUNCTION knob of the stereo amplifier to the PHONO position, and adjust the LEVEL ADJUST control on the tuner to make the two levels equal. When the stereo amplifier FUNCTION knob is switched over to TUNER to connect the amplifier with the tuner, there will be no sudden jump in amplifier output level.

The output level of the VARIABLE OUTPUT increases when the control is turned clockwise.

The LEVEL ADJUST effects the VARIABLE OUTPUT only, it has no effect on the FIXED OUTPUT.

⑤ VARIABLE OUTPUT JACKS (Output-Variable)

Connect to the input (TUNER) of the stereo amplifier using the pin plug connecting cable (supplied). Be sure however, that the left and right channels have been connected correctly.

A word of caution. If the connecting cable runs parallel to the power supply cord, or if it is allowed to hang or lie in loops etc. a low hum sound may be produced.

The output level can be adjusted by the LEVEL ADJUST control to any value between 0 and 1.5V.

⑥ FIXED OUTPUT JACKS (Output-Fixed)

Connect the fixed outputs (fixed at 1.0V when the level is modulated 100%) to the inputs of the stereo amplifier.

Switch the FUNCTION knob of the stereo amplifier to PHONO, and if the fixed level differs from that of the PHONO level, it is better to use the VARIABLE OUTPUT.

When you want to record FM broadcasts etc., connect the fixed outputs to the tape deck recording jacks. The level adjustment in this case however, is to be made on the tape take itself.

⑦ AC POWER SUPPLY FUSE (AC Line Fuse 0.5A/1A)

If the fuse has to be replaced at any time, be sure to replace it with the specified fuse.

⑧ AC POWER SUPPLY CORD (AC Cord)

Connect this cord to the power supply socket. If the power supply voltage varies by more than ±10% of the rated voltage for this tuner, a voltage regulator set to the rated voltage, must be employed.

⑨ DETECTOR OUTPUT JACK (Det. Out)

This is the output to be used if you wish to use another stereo decoder, or if you wish to receive 4 channel stereo broadcasts in the future.

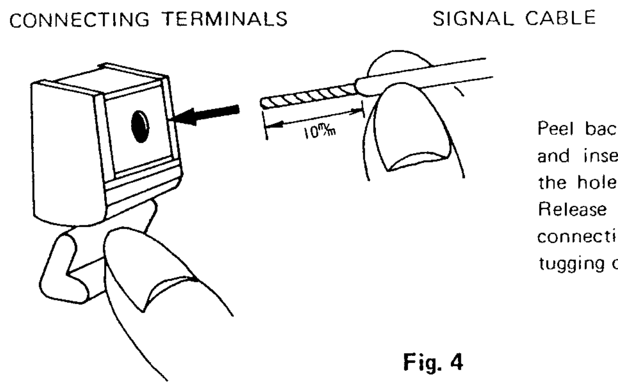
⑩ EXTERNAL INPUT TERMINALS (Ext. Input)

These inputs are for any external input signals you may wish to measure. Be always sure however, to connect the GROUND of the equipment to be measured, to the GND of the FM 75Ω ANTENNA input.

The maximum measurable input level is 30V rms. To measure a particular level, switch the EXTERNAL ATT knob on the front panel to a readable position, and then read the level indicated.

When you have no idea what the level of the input signal will be, always set the EXTERNAL ATT knob to +30dB as a safety precaution.

Any outputs required should be taken from the terminal located below the input terminal.



Peel back about 10mm of the covering, and insert the naked wire portion into the hole while pushing the lower lever. Release the lever and check that proper connection has been made by gently tugging on the cable.

Fig. 4

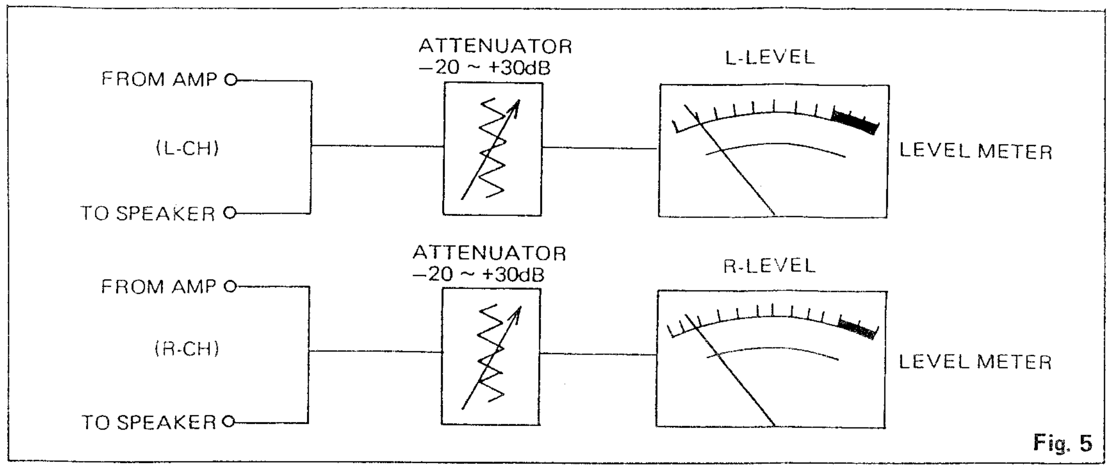


Fig. 5

⑪ MULTI-PATH OUTPUT JACKS (Multi-Path/Vert-Horiz)

FM broadcast waves move in straight lines like ordinary light, and will reflect off the sides of buildings and mountains etc. Reflected waves picked up by the antenna arrive slightly behind the direct waves, causing interference and phase distortion. This is the cause of "ghosts" sometimes seen in TV screens. In FM reception, it causes distortion and deterioration in separation.

Such reflected waves are called multi-path waves. (See Fig. 6).

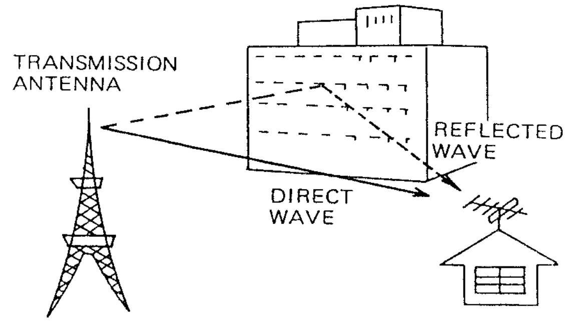


Fig. 6

In order to reduce this multi-path problem, increase the number of antenna elements, thereby increasing the directional characteristics of the antenna. Location of the antenna, and correct directioning are also very important.

The multi-path jacks have been installed to make the directional adjustments accurate. The two outputs are:—

VERT	multi-path wave output.
HORIZ	decoded FM carrier wave output.

(For further details, please refer to "MULTI-PATH MEASURING METHODS" on page 13).

HOW TO CONNECT YOUR FM ANTENNA

WHEN USING 300Ω BALANCED FEEDER WIRE

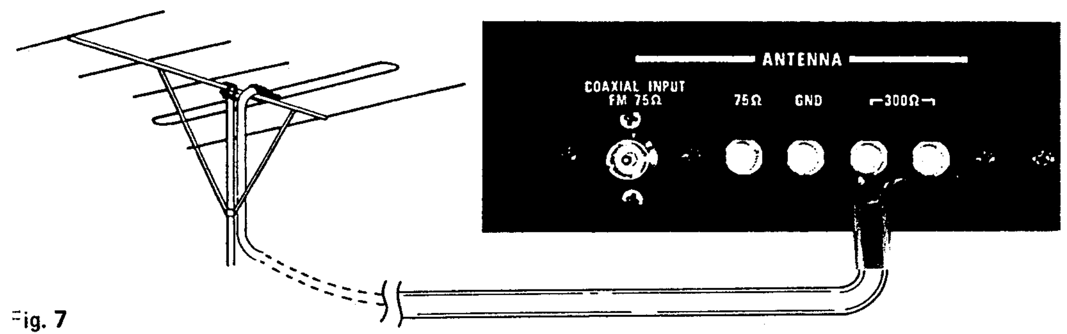


Fig. 7

WHEN USING 75Ω COAXIAL CABLE

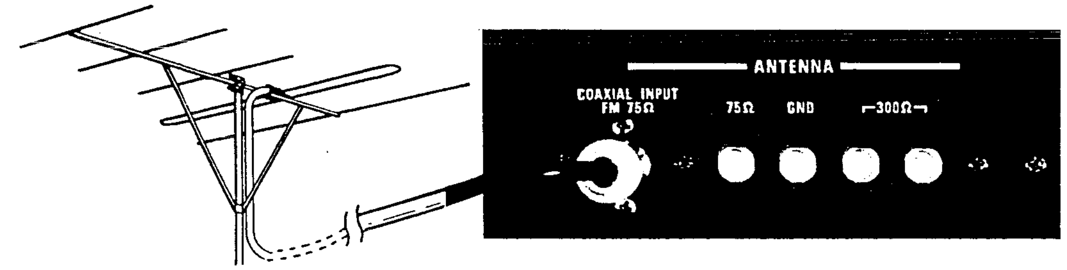
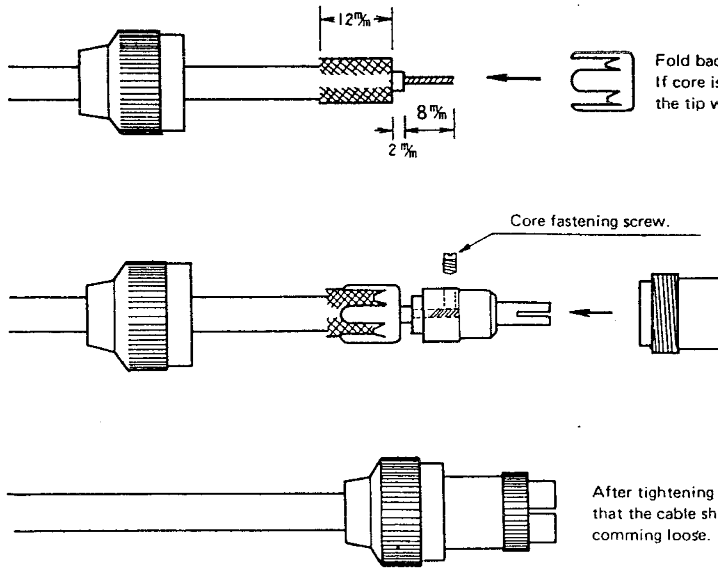


Fig. 8

OW TO ATTACH THE COAXIAL CONNECTOR

Many different kinds of coaxial cables, varying in thickness, are available on the market these ys, but the most suitable type for the TU-500 equipment is 3C-2V.

Fig. 9 shows how the coaxial connector is joined to the coaxial cable.



Fold back about 12mm of braid. If core is stranded wire, bind the tip with solder.

After tightening the cap, check that the cable shows no sign of comming loose.

Fig. 9

HOW TO CHOOSE THE PROPER ANTENNA

Reception Area	Rocal Reception Conditions	Suitable Antenna	Remark
Near area from the transmission antenna.	Residential Area with little electrical noise. Signal strength is strong.	Simple indoor T-form antenna, 2-element FM antenna, ordinary TV antenna.	If the ordinary TV antenna is to be used (which is also being used by the TV set itself), an antenna distributor will have to be used.
	Strong signal strength field, but plenty of interfering noise.	2 or 3 elements FM antenna, Combined TV/FM antenna.	Antennas with 3 or more elements have a much higher gain, and reduce noise effectively, so it is recommended that only for FM reception antenna be used.
Not so near area from the transmission antenna.	Signal strength not strong, but little noise.	3 elements FM antenna, combined TV/FM antenna.	
	Signal strength not strong, and much noise present.	3 to 5 elements FM antenna.	If there is considerable noise interference, use coaxial cable for the feeder connection between antenna and tuner. Coaxial cables are particularly effective in reducing local noises such as car ignition noise.
Distant area from the transmission antenna.	Signal strength weak, and little noise.	FM antenna with more than 5 elements.	

MULTI-PATH MEASURING ME

Two methods for measuring m
explained below, although one of them
technical, requiring specialized meası
ment and a second amplifier.

If the explanation is not clear eno
your nearest DENON authorized dealeı

I. MEASURING WITH MEASU STRUMENT

This method requires an oscillosc

Connect the VERT output to the
the oscilloscope, and the HORIZ oı
H-INPUT. Adjust the antenna while v
oscilloscope. (See Fig. 10).

Turn the antenna round to the pc
produces a near horizontal line, with as
component as possible, on the oscillos
The horizontal direction represents the
carrier wave, while the vertical directio
the multi-path wave. (See Fig. 11)

II. MEASURING WITH AUDIO EQL

This method can be performed
own stereo amplifier and speakers.

Connect the VERT output to
INPUT L channel, and the HORIZ out
channel. (See Fig. 12)

(Switch the stereo amplifier FU
AUX.)

While the antenna direction is bei
listen to the sound in both L and
alternatively using the stereo amplifier
knob. First set the antenna to give t
reception in the R channel. Then while
the L channel, adjust the antenna furth
get the minimum amount of noise (t
multi-path noise). (See Fig. 13). This f
direction will give you the best receptic
it will not necessarily be the strongest.

If your stereo amplifier has two A
connect the VERT output to AUX
HORIZ output to AUX-2. The sounds
compared by simply switching the
knob on the stereo amplifier back
between AUX-1 and AUX-2.

The main point to remember in th
is that the HORIZ component (direct w
made as large as possible, while the VE
nent (reflected wave) is to be made
possible.

HOW TO CHOOSE THE PROPER ANTENNA

Reception Area	Rocal Reception Conditions	Suitable Antenna	Remark
Near area from the transmission antenna.	Residential Area with little electrical noise. Signal strength is strong.	Simple indoor T-form antenna, 2-element FM antenna, ordinary TV antenna.	If the ordinary TV antenna is to be used (which is also being used by the TV set itself), an antenna distributor will have to be used.
	Strong signal strength field, but plenty of interfering noise.	2 or 3 elements FM antenna, Combined TV/FM antenna.	Antennas with 3 or more elements have a much higher gain, and reduce noise effectively, so it is recommended that only for FM reception antenna be used.
Not so near area from the transmission antenna.	Signal strength not strong, but little noise.	3 elements FM antenna, combined TV/FM antenna.	
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Distant area from the transmission antenna.	Signal strength weak, and little noise.	FM antenna with more than 5 elements.	

MULTI-PATH MEASURING METHODS

Two methods for measuring multi-path are explained below, although one of them is somewhat technical, requiring specialized measuring equipment and a second amplifier.

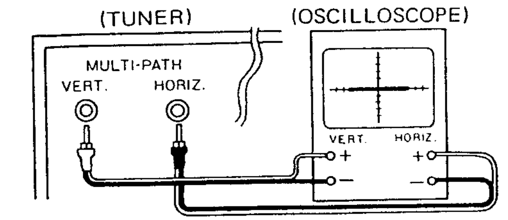
If the explanation is not clear enough, contact your nearest DENON authorized dealer.

I. MEASURING WITH MEASURING INSTRUMENT

This method requires an oscilloscope.

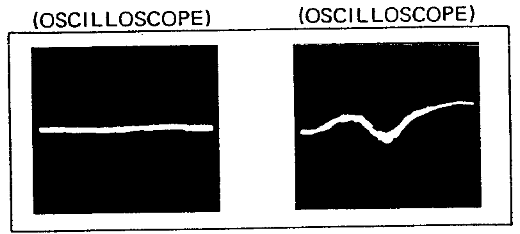
Connect the VERT output to the V-INPUT of the oscilloscope, and the HORIZ output to the H-INPUT. Adjust the antenna while watching the oscilloscope. (See Fig. 10).

Turn the antenna round to the position which produces a near horizontal line, with as little vertical component as possible, on the oscilloscope screen. The horizontal direction represents the decoded FM carrier wave, while the vertical direction represents the multi-path wave. (See Fig. 11)



(How to make the connections for multi-path measurements when using an oscilloscope).

Fig. 10



GOOD (SMALL MULTI-PATH WAVES)
(a)

POOR (LARGE MULTI-PATH WAVES)
(b)

Fig. 11

II. MEASURING WITH AUDIO EQUIPMENT

This method can be performed using your own stereo amplifier and speakers.

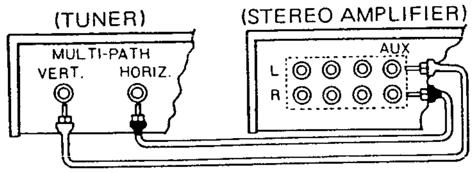
Connect the VERT output to the AUX-INPUT L channel, and the HORIZ output to the R channel. (See Fig. 12)

(Switch the stereo amplifier FUNCTION to AUX.)

While the antenna direction is being adjusted, listen to the sound in both L and R channels alternatively using the stereo amplifier BALANCE knob. First set the antenna to give the strongest reception in the R channel. Then while listening to the L channel, adjust the antenna further until you get the minimum amount of noise (the pulsating multi-path noise). (See Fig. 13). This final antenna direction will give you the best reception, although it will not necessarily be the strongest.

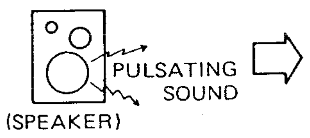
If your stereo amplifier has two AUX systems, connect the VERT output to AUX-1, and the HORIZ output to AUX-2. The sounds can then be compared by simply switching the FUNCTION knob on the stereo amplifier back and forth between AUX-1 and AUX-2.

The main point to remember in these methods is that the HORIZ component (direct wave) is to be made as large as possible, while the VERT component (reflected wave) is to be made as small as possible.



(How to make the connections for multi-path measurements when using your own audio equipment)

Fig. 12

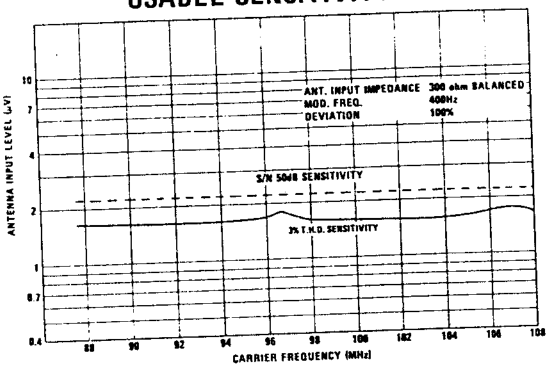


Rotate the antenna to find the position giving minimum pulsating sound.

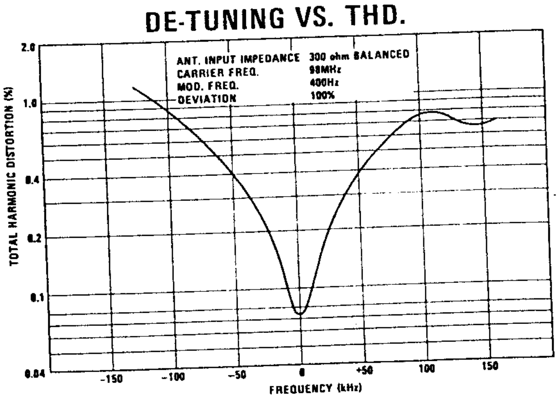
Fig. 13

CHARACTERISTICS CHARTS

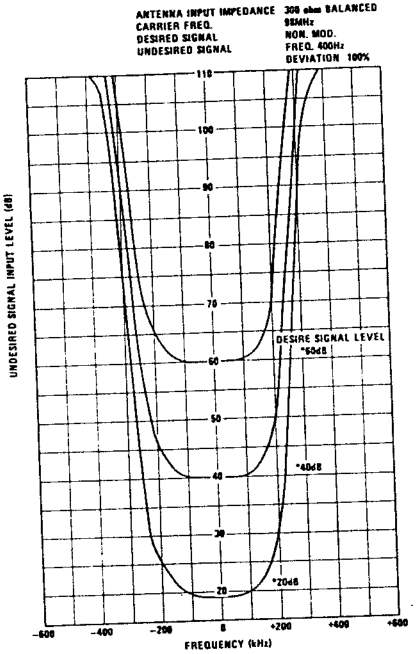
USABLE SENSITIVITY



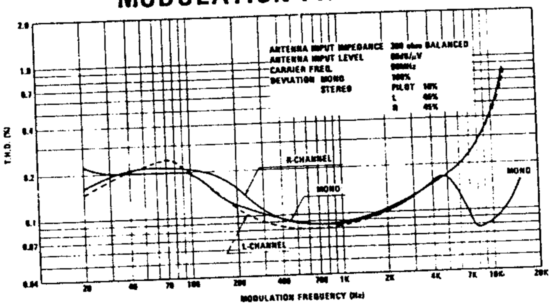
DE-TUNING VS. THD.



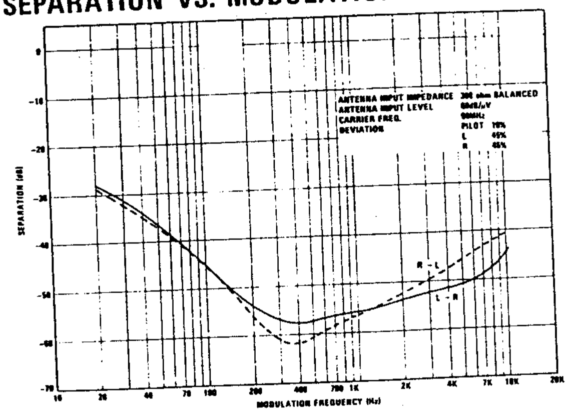
TWO SIGNAL SELECTIVITY



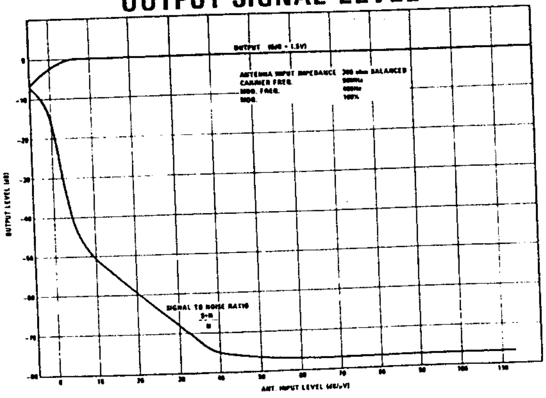
HARMONIC DISTORTION VS. MODULATION FREQUENCY



SEPARATION VS. MODULATION FREQUENCY



ANTENNA INPUT SIGNAL LEVEL VS. OUTPUT SIGNAL LEVEL



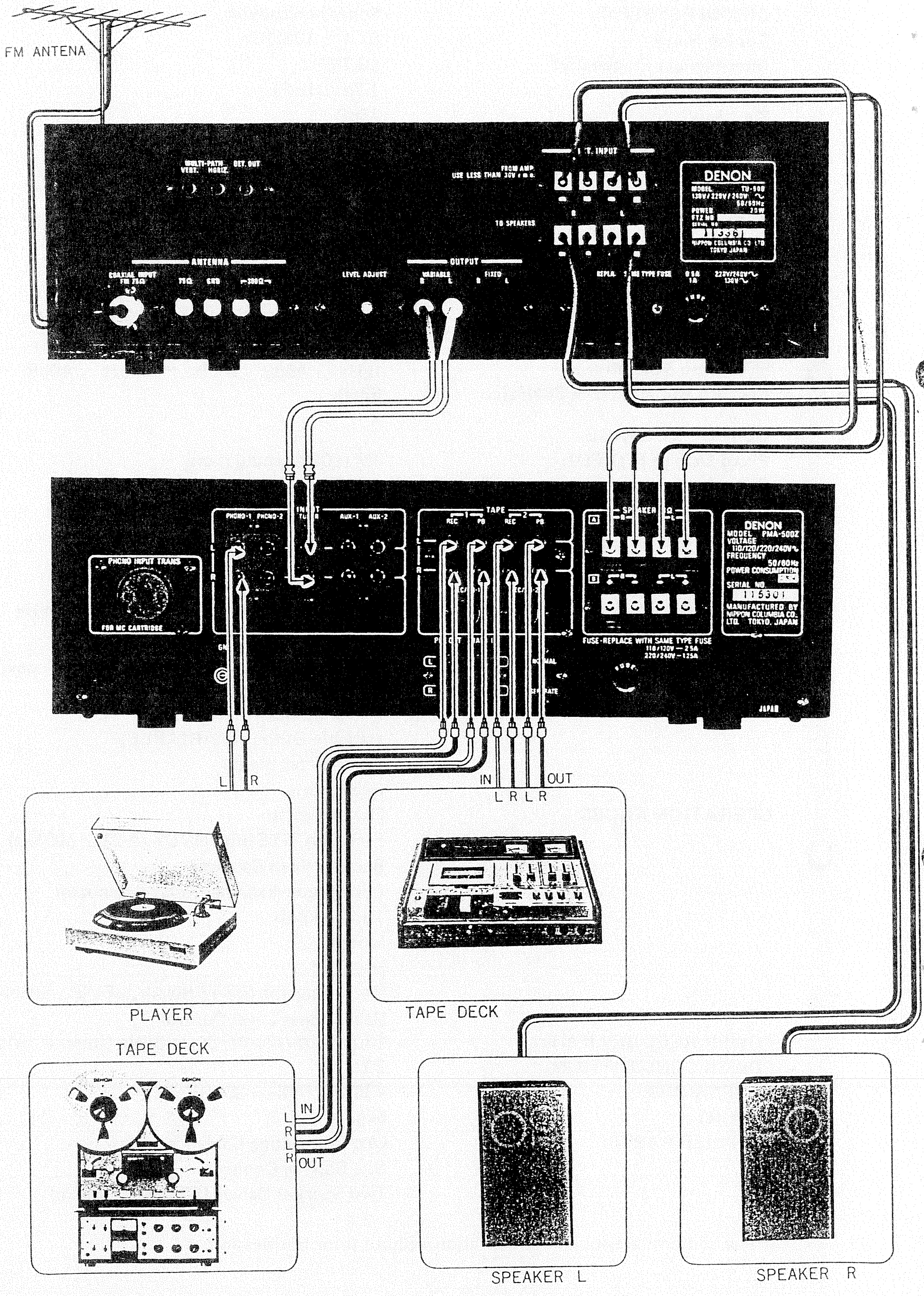
TU-500 BLOCK DIAGRAM

SPECIFICATIONS

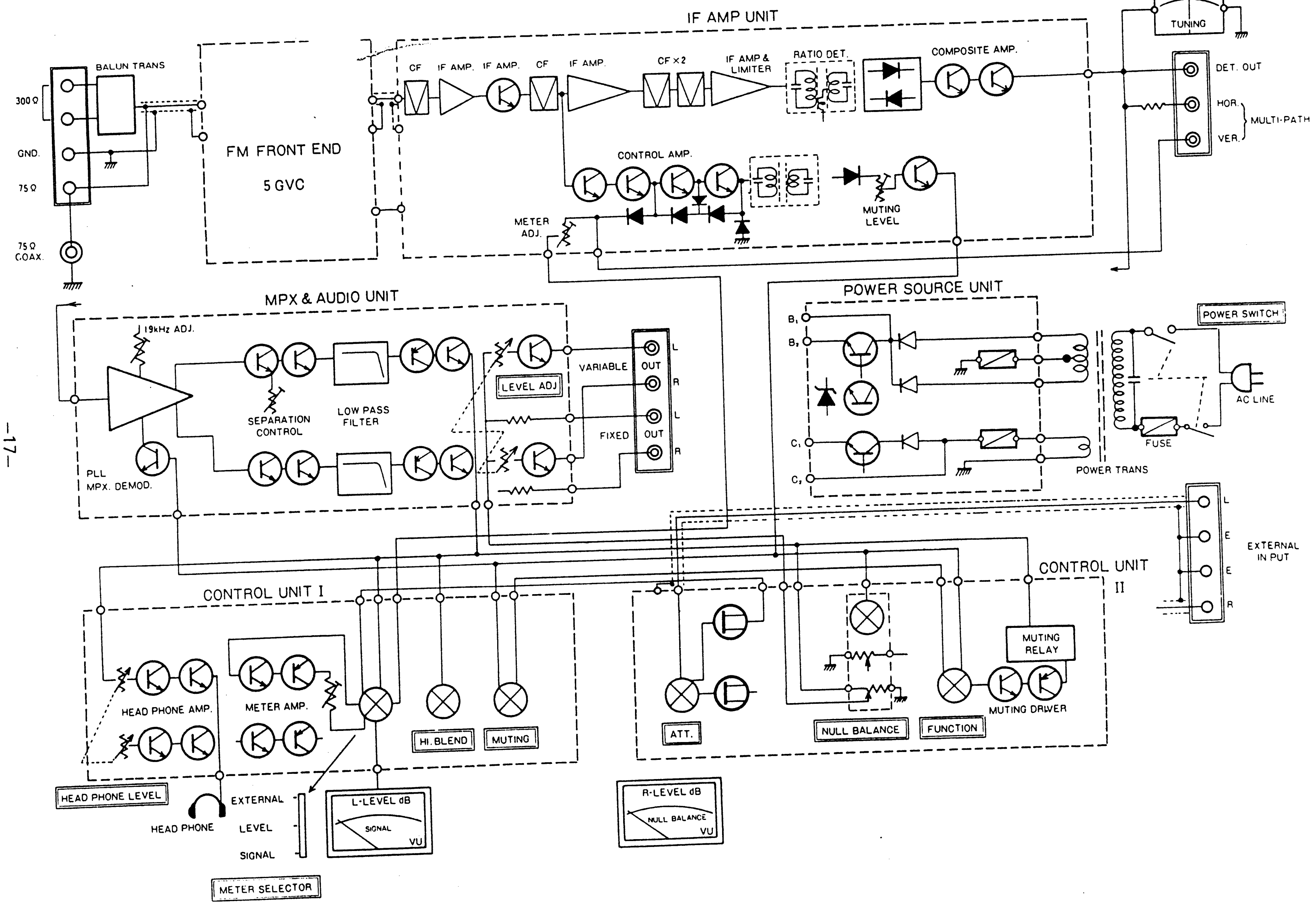
CIRCUIT SYSTEM:	Super heterodyne
Tuning Range:	87.4 ~ 108MHz
Intermediate Frequency:	10.7MHz
Usable Sensitivity:	1.7μV (IHF)
Signal to Noise Ratio:	75dB
AM Suppression:	60dB
Capture Ratio:	1.0dB
Effective Selectivity:	80dB
Image Rejection:	110dB
IF Rejection:	110dB
Spurious Response:	110dB
Frequency Response:	20Hz ~ 15kHz +0.2dB -1.5dB
Total Harmonic Distortion:	(MONO) 1kHz 0.2%, 50Hz ~ 10kHz 0.3% (STEREO) 1kHz 0.2%, 50Hz ~ 5kHz 0.3%
FM Stereo Separation:	1kHz 45dB 100Hz ~ 10kHz 40dB
Carrier Leak (19kHz & 38kHz):	65dB
OUTPUT VOLTAGE	
Fixed Output (FIXED):	1V (100% modulation)
Output Impedance:	4.7kΩ
Variable Output (VARIABLE):	0 ~ 1.5V
Output Impedance:	200Ω
Headphones output (Rated voltage):	10mV (8Ω LOAD)
LEVEL METERS	
Indication Error:	±0.2dB (EXT. INPUT –20 ~ +30dB) 1kHz
Frequency Response:	20Hz ~ 15kHz ±0.5dB
CONNECTORS TERMINALS:	Antenna (300Ω, 75Ω terminals & 75Ω coaxial connector) Multi-path Detection Fixed Output (FIXED) Variable Output (VARIABLE) Level Meter Inputs Headphones
OPERATION KNOBS:	Power Switch Function (STEREO ONLY, AUTO, MONO) Balance (Null Balance) Level Meter External Input Attenuator Tuning knob Muting Hi.Blend Meter Selector (EXTERNAL, LEVEL, SIGNAL) Headphones Level Control
POWER REQUIREMENT:	130V/220V/240V, 50Hz/60Hz (Internal switching)
POWER CONSUMPTION:	20W
DIMENSIONS:	430W x 140H x 350D (mm)
WEIGHT:	9kg
SUPPLIED PARTS:	One Connecting Cable (50cm) One Coaxial Connector Two Speaker Cables (50 strand) (50cm)

These contents are subject to alteration without prior notification.

EXAMPLE OF SYSTEM COMPOSITION

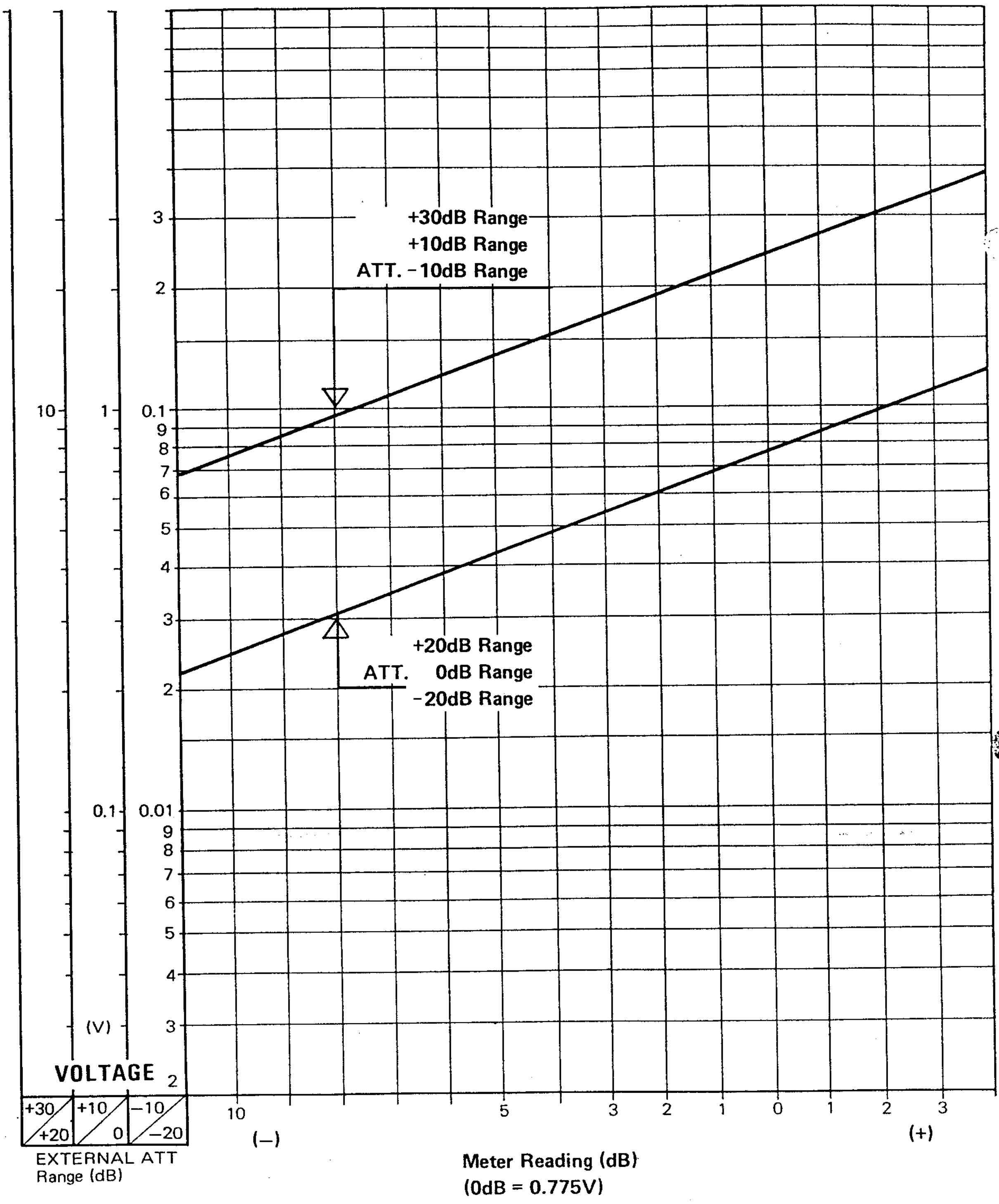

FM ANTENNA
ANTENNA
OUTPUT
LEVEL ADJUST
TO SPEAKERS
DENON
TU-500
PHONO INPUT TRANS
FOR MC CARTRIDGE
PHONO-1
PHONO-2
AUX-1
AUX-2
TAPE
REC
PB
DENON
MODEL PMA-500Z
FUSE-REPLACE WITH SAME TYPE FUSE
JAPAN
L
R
IN
OUT
L
R
L
R
PLAYER
TAPE DECK
TAPE DECK
IN
L
R
L
R
OUT
SPEAKER L
SPEAKER R

TU-500 BLOCK DIAGRAM

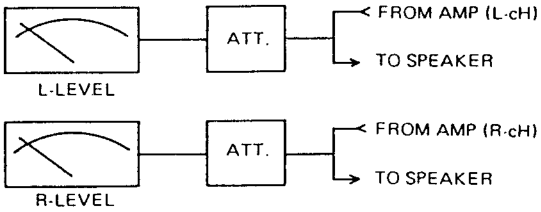

IF AMP UNIT
TUNING
BALUN TRANS
300Ω
GND.
75Ω
75Ω COAX.
FM FRONT END
5 GVC
CF
IF AMP.
IF AMP.
CF
IF AMP.
CF ×2
IF AMP & LIMITER
RATIO DET.
COMPOSITE AMP.
DET. OUT
HOR.
VER.
MULTI-PATH
CONTROL AMP.
METER ADJ.
MUTING LEVEL
MPX & AUDIO UNIT
19kHz ADJ.
SEPARATION CONTROL
LOW PASS FILTER
PLL MPX. DEMOD.
LEVEL ADJ
VARIABLE
FIXED
OUT
OUT
L
R
L
R
POWER SOURCE UNIT
B₁
B₂
C₁
C₂
POWER TRANS
FUSE
POWER SWITCH
AC LINE
EXTERNAL IN PUT
L
E
E
R
CONTROL UNIT I
CONTROL UNIT II
HEAD PHONE AMP.
METER AMP.
HI. BLEND
MUTING
HEAD PHONE LEVEL
HEAD PHONE
EXTERNAL
LEVEL
SIGNAL
METER SELECTOR
L-LEVEL dB
SIGNAL
VU
R-LEVEL dB
NULL BALANCE
VU
ATT.
NULL BALANCE
FUNCTION
MUTING RELAY
MUTING DRIVER

USING THE METER-1 AND METER-2 AS THE VOLT METER

VOLTAGE CONVERSION CHART



USING THE METER-1 AND METER-2 AS THE POWER METERS


ATT.
FROM AMP (L-cH)
TO SPEAKER
L-LEVEL
ATT.
FROM AMP (R-cH)
TO SPEAKER
R-LEVEL

POWER OUTPUT CONVERSION CHART